VOCSMAT: A CONNECTIONIST-INSPIRED TREATMENT PROPOSAL FOR RELATIONAL TRAUMAS

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Abstract

Psychological traumas are the main cause of post-traumatic stress disorder, which can be either simple or complex. Psychological traumas of various kinds are also present in a wide range of psychological conditions, including disorganised attachment, personality disorders, eating disorders, bipolar disorder and schizophrenia. For such conditions, traumatic experiences are often regarded as an exacerbating factor of symptoms induced by another major causative agent, often of a genetic-biological nature. The objective of this work is to propose an alternative vision, in which traumatic experiences represent an essential ingredient for the aforementioned conditions. This vision is based on a functional model of the mind, built around the concept of relational value, with ideas borrowed from the fields of computer science, artificial intelligence and neural networks. The analysis of mental dynamics accounts for the use of dissociation as primary response to trauma, explains the emergence of splitting as secondary defence line, and identifies in selective dissociation the tool used by the mind to survive and function in traumatic contexts. Finally, the insight gained through the model is used to sketch a new psycotherapy for psychological traumas.

1 Introduction

The field of "psychotraumatology" is concerned with the investigation of psychological traumas of different kinds and associated mental structures. The initial response to trauma is represented by dissociation (Lanius, 2015), described as "a last resort defensive strategy" or "the escape when there is no escape". In the long term, the most common outcome of severe traumatic experiences is a characteristic syndrome called "post-traumatic stress disorder" (PTSD) (Andreasen, 2010), which can be "complex" when the traumas are repeated over a long period of time. (Herman, 1992).

However, unresolved traumas are hypothesised to be present in a broader set of psychological conditions. The "freezing" behaviour of children with disorganised attachment is reminiscent of a dissociative process induced by an inappropriate interaction style of the caregiver (Main and Solomon, 1986). A history of childhood traumatic experiences is thought to be a contributing factor for personality disorders (Elices et al., 2015; Fenske and Schwenk, 2009; Lowen, 2004) and eating disorders (Phillips, 2004). Psychological traumas of various kinds may be involved in the pathogenesis of schizophrenia (Horan and Blanchard, 2003) as well as of bipolar disorder (Aas et al., 2016). Childhood trauma and PTSD symptoms may also contribute to age-related

cognitive decline (Burri et al., 2013), while less severe traumatic forms affect at all ages possibly every human being on planet earth.

The most traditional treatment for psychological traumas is represented by psychodynamic therapy, which sees intrapsychic conflicts as the origin of mental disorders, and identifies in verbal elaboration the preferred treatment strategy (Ahles, 2004). Cognitive Behavioural Therapy (Longmore and Worrell, 2007) sees dysfunctional beliefs and behaviours as the root cause of psychopathology, and treats symptoms through the direct manipulations of distorted thoughts, dysfunctional emotions and maladaptive behaviours of the patient.

EMDR (Eye movement desensitisation and reprocessing) (Shapiro and Laliotis, 2010) is a recent clinical method, effective in the treatment of some psychological conditions, including PTSD. The theoretical framework underlying EMDR psychological links traumas to the presence of unprocessed and incomplete mnestic traces, mostly disconnected from the rest of memory. The EMDR procedure works by accessing and reprocessing such traces, allowing their integration with the rest of memory. This therapy is reported to produce results quickly and reliably.

The objective of this work is to propose an alternative vision, in which traumatic experiences represent an essential ingredient for the aforementioned conditions. This vision is based on a functional model of the mind, built around the concept of relational value, with ideas borrowed from the fields of computer science, artificial intelligence and artificial neural networks. The rest of the paper is organised as follows: the model is introduced in section 2 and 3; section 4 describes our treatment proposal; section 5 draws the conclusions and outlines future research directions.

2 A model for the mind

Relational value

Mental reality can be conceived a set of **situations**, each characterised by a list of **active features**. Examples of features are: “round shape”, “blue color”, “green unicorns”, “tennis players”, “yoga teacher”. Feature activation and deactivation is a continuous process driven by sensory stimuli, occurring on a fast time scale as the mind “navigates” through everyday life.

We assume that features are characterised by a property called **relational value**, that can be either positive or negative. “Honesty” and “beauty”, for example, are positive features, while “arrogance” and “violence” are generally considered negative features. The determination of feature value happens by association: if a new feature of unknown value is associated to positive (negative) features, it will assume a positive (negative) value. Since a feature in general takes part in many associations, its value will be determined by the combined effect of all associations.

Social and hierarchical judgements play a key role in human behaviour. Emotions are often produced as a reaction to the actions of another person within a relational context, and depend on the appraisal of who is superior and who is inferior, who is right and who is wrong. The link between hierarchical judgements and emotions has been recognised and studied: the association of shame, guilt and sadness to a lower social status is confirmed by numerous studies (Stevens and Price, 1996), as well as the association of anger to a higher social status (Tiedens, 2011).

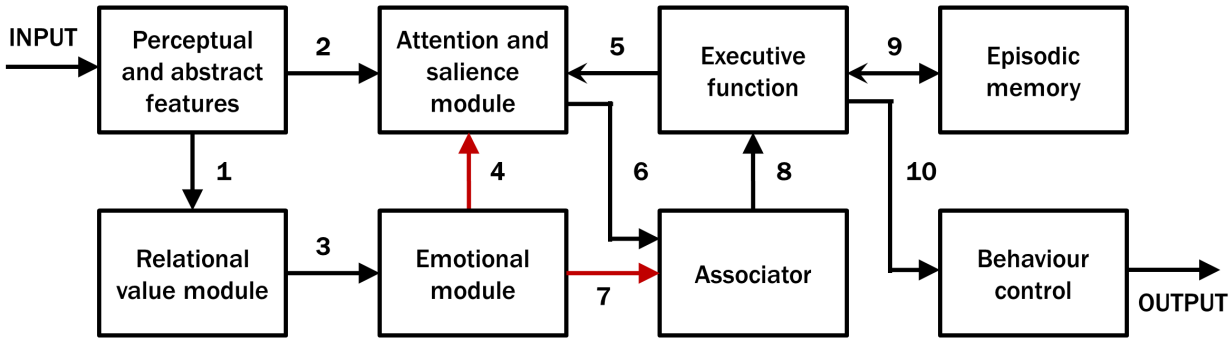

Figure 1: Functional modules of the mind. The mind is represented as a set of intereacting modules that receive perceptual information (input) and produce motor commands (output). Emotional channels, which play a prominent role in the model, are shown in red.

Functional modules of the mind

The mind can be represented as a set of interacting functional modules (Fig. 1). **Perceptual and abstract features** are created from sensory input and fed (link 1 in the figure) to the **relational value module**, which adds value to active features and computes the value of two key symnols: the self and the object. This information is passed (link 3) to the **emotional module**, that responds with an appropriate emotion. Features are also sent in parallel (link 2) to the **attention and salience module**, which uses the information about the current task pursued by the **executive module** (link 5) and the current emotional response (link 4) to produce features loaded with salience.

Salient features and emotions are fed (6,7) to the associator, which binds them together, produces a new memory record and passes it (8) to the executive function. Here the newly formed association is compared with the content of **episodic memory** (9) and with the mind's objectives. Based on this comparison, the executive function registers the current record in memory and directs behaviour through the **behaviour control module** (10).

According to current knowledge, the relational and emotional modules could be localised in the medial prefrontal, cingulate and insular cortex (Palmiter, 2008; Etkin et al., 2011; Gu et al., 2013), while the salience module may correspond to the striatum, a region involved in reward mechanisms (Martin-Soelch et al., 2001). The executive function is implemented in the prefrontal cortex, the behaviour control module is localised in the motor cortex and the associator corresponds to the hippocampus, a structure essential for memory formation. Features and episodic memory are distributed across the whole cortex.

Relational poles, emotions and salience

The relational value module (Fig. 2-left panel) assigns value to active features fed from the perceptual apparatus and calculates a value for two key symbols: the self and the object. Depending on the value of such symbols, it selects one of four possible **relational poles**, each associated to specific emotions, produced by the emotional module (Fig. 2-right panel): **pole A** (self and

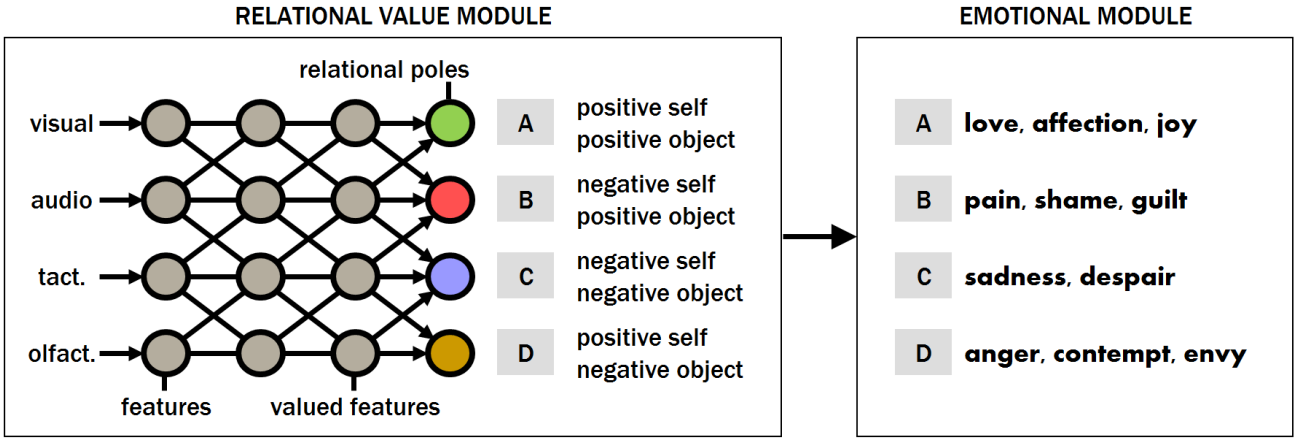

Figure 2: Relational judgements and emotions. The relational module (on the left) adds value to features and computes the value of self and object. As a result, the current situation (characterised by a combination of active valued features), is mapped to one of four relational poles. Each pole corresponds to a different combination of values for self and object and is associated to specific emotions, produced by the emotional module (on the right).

object both positive: the self feels love and affection or joy for /with a rewarding object); **pole B** (negative self and positive object: the self feels pain, shame or guilt in front of a superior /humiliating object); **pole C** (self and object both negative: the self feels sadness or despair when self and object are both worthless); **pole D** (positive self and negative object: the self feels anger, contempt or envy for an inferior object).

We assume that the emotional intensity E is proportional to the sum of the object value Vobj and of the self value Vself. (In case B and D self and object have opposite sign, and the sum is effectively a difference between their absolute values). Self and object values are in turn determined by the sum of the values of all active features associated to them, $\mathrm{Vs_i}$ and $\mathrm{Vo_i}$. In formulas (S is the sigmoid function, which prevents emotional values from exceeding a maximum threshold):

$$\mathrm{E} = \mathrm{S}(\mathrm{Vobj} + \mathrm{Vself}) \qquad \mathrm{Vself} = \mathrm{S}(\textstyle\sum_i \mathrm{Vs_i}) \qquad \mathrm{Vobj} = \mathrm{S}(\textstyle\sum_i \mathrm{Vo_i})$$

In our model of brain architecture, emotional experience is complemented by salience generation. Salience is a quality that defines the relative importance or prominence of a feature with respect to other features. Salient features receive a higher level of attention. We hypothesise that salience is attached to features based on two criteria. The first criterion is the degree of contribution of the feature to the emotion generated (link 4 in Fig. 1). If, for instance, a person feels ashamed because he/she has bat ears, the feature “ears” has high salience. In other words, the salience module is telling the mind: “you are not far from emotion E, which mostly depends on features X,Y: these are the features you need to monitor if you want to experience /avoid emotion E”.

The second criterion for salience attribution is the relevance of the feature for the task currently pursued by the executive function (link 5). If, for instance, a person is looking for the car

key, all objects resembling keys get visual priority, while objects of different shapes are ignored. In this case, the message is: “features X,Y are linked to objective O on your agenda: these are the features you need to look at if you want to reach /avoid objective O”. The idea that neurons in the limbic system encode two kinds of salience (emotional and motivational) is not new (Bromberg-Martin et al., 2010).

3 Normal and traumatic contexts

Normal functioning

Let us define a **situation** as a set of features simultaneously active. Examples of situations are: “piano lesson with mother” (coactivated features: image of piano, image of hands on the keyboard, sound of mother voice, sound of piano, etc.); “tennis match with a friend” (coactivated features: image of racquet, image of opponent, sound of racquet hitting the ball, odour of sweat, etc.). Situations can be thought of as belonging to different **contexts**, such as “mother relation”, “father relation”,“peer relation”, etc. (Fig. 3-left panel). A context can be conveniently represented on a plane, in which points correspond to individual situations (Fig. 3-mid panel). Each point is associated to a couple of values for self and object and corresponds to an emotion, whose intensity is represented with the colour shade. As a result, each point belongs to the “zone of influence” of one of the four relational poles.

Each pole originates from a point representing the most prototypical situation of the pole, and extends towards less prototypical situations. The epicentre of Pole B, for instance, may correspond to a situation characterised by a very bad object’s behaviour, causing strong pain and shame, while points further away may be characterised by a better object’s behaviour. We define a context “normal” if the highest emotional levels are not too high. In this condition the mind can switch smoothly between all poles, experiencing different levels of the emotions associated to each pole (Fig. 3-mid panel).

Traumatic functioning: dissociation

In our model, the relational poles that can be involved in a trauma are those indicated with B and C, in which the self is negative (**negative poles** for brevity). Pole B is characterised by a negative self and a positive object: an example of a point belonging to pole B is a situation of physical or verbal abuse. Pole C is characterised by a self and an object which are both negative: this may correspond to situations in which all family members are exposed to a natural disaster, or poverty.

In our definition, a trauma occurs when the intensity of the elicited emotions is too high. In case of pole B, based on what we said in section 2, this requires the existence of a value gap between the self and the object (with the object worthier than the self). This in turn requires that object-associated features have on average a higher value than self-associated features. If a person with bat ears, big nose and thin lips thinks that these features are very negative and he/she gets criticised or made fun of for them, a trauma may take place.

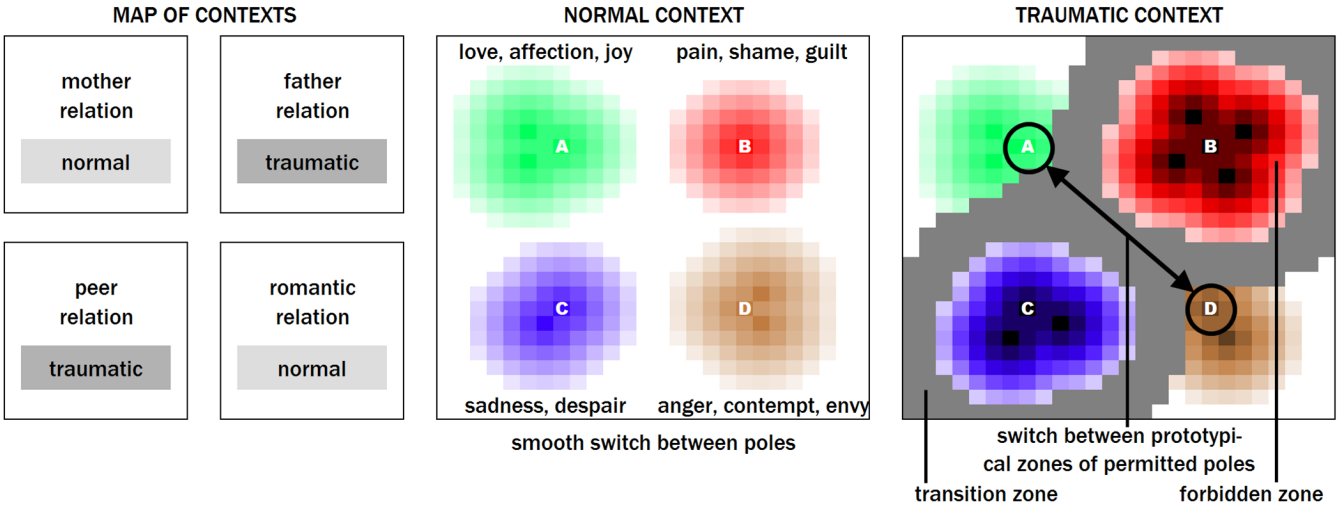

Figure 3: Normal and traumatic contexts. The left panel shows the map of contexts. Points in the context plane represent situations, defined as sets of coativated features. Each point is associated to a couple of values for self and object and corresponds to an emotion, whose intensity is represented with the colour shade. In a normal context (mid panel), the mind can switch smoothly between relational poles, no pole requires dissociation and the repertoire of emotions is fully accessible. In a traumatic context (right panel), pole B and/or pole C are characterised by too intense emotional levels, and are inhibited. When the mind happens to be in one of these poles (forbidden zone), dissociation intervenes. To avoid dissociation, the mind oscillates between poles A and D, staying in each pole as long as the situation is prototypical for the pole. When the situation drifts out of the free zone into the transition zone (shown in grey), splitting symptoms appear, and the mind switches to the free zone of the other permitted pole.

We conjecture that, upon the occurrence of a trauma, the associator stops working: this corresponds to the phenomenon of **dissociation**, defined as the distortion, limitation or loss of the normal associative links between perceptions, emotions, thoughts and behaviour. Dissociation can take the form of mental "black-out", depersonalisation (feeling of separation from one's body), derealisation (feeling of being detached from the world), selective amnesia and emotional detachment (Lanius, 2015; Radovic and Radovic, 2002). Dissociation can be thought of as a last resort defense, which disconnects the associator from its input, not unlike what happens when a fuse disconnects part of an electric circuit in case of a current spike.

Traumatic functioning: splitting

The adoption of dissociation makes it possible for the mind the stay on a traumatic point, excluding intolerable emotions and thoughts from consciousness. However, the non-perception of aspects of reality may hide potential dangers and have a high cost. Therefore, the mind will try to avoid the traumatic poles (B and C) and head towards the positive poles (A and D) where reality perception is not restricted. We can think to divide the space of a traumatic context into three zones (Fig. 3-right): the "free zone", an area far from all traumatic poles (or near a positive poles, A or D); the "forbidden zone", an area near a traumatic pole which cannot be accessed in a non-dissociated state; the "transition zone", a safety belt around the forbidden zone.

Let us assume that, in a traumatic context, the mind is initially near pole A. The mind will

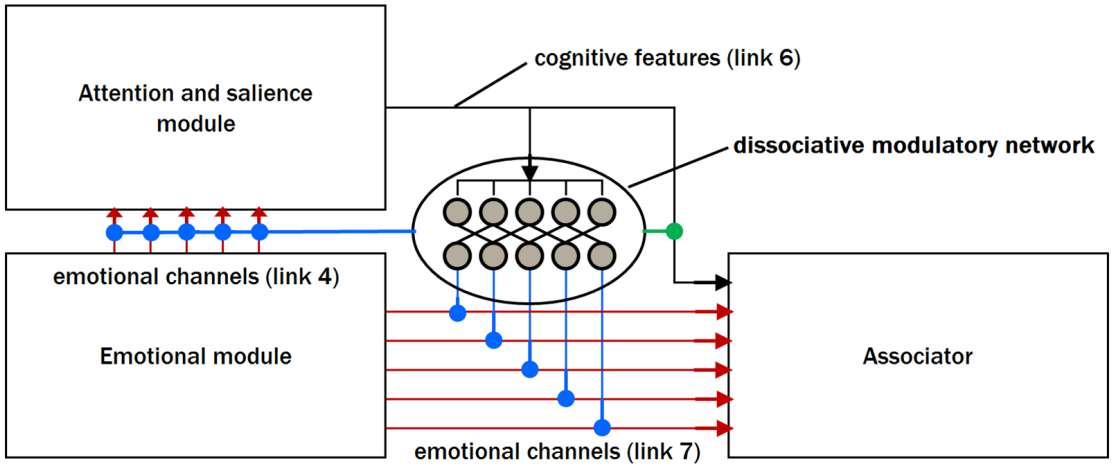

Figure 4: Emotional dissociation, dissociative modulatory network. This figure shows a magnification of some of the modules in Fig. 1. The "bundle" of cognitive features filtered by the salience module (link 6) is fed in parallel to the associator and to the DM network. The latter processes the current set of active features and sends modulatory signals (shown in blue) to the emotional channels (link 4 and link 7, shown in red). The modulated emotional channels are fed to the associator (link 7), which binds them together with the cognitive features, and produces a record to be stored in episodic memory. The DM network may send signals (shown in green) also to link 6, modulating the perception and awareness of cognitive features.

stay in the free zone around pole A as long as conditions are prototypical for pole A, i.e. as long as the object relation is perfect, full of trust, mutual respect, etc. As the situation departs from pole A prototypical scenario and drifts into the transition zone, the mind switches abruptly to the free zone around pole D. When the situation deviates from pole D prototypical scenario, the mind returns to pole A, and the cycle repeats itself. This corresponds to the defense mechanism of **splitting**, defined as the inability to integrate positive and negative aspects of self and others, which results is a view of the world in "black and white" (Perry et al., 2013).

The transition zone is an area close to a traumatic pole, but in which dissociation is not used: it is therefore characterised by high emotional levels. This determines an increase of the emotional salience of the features involved in the trauma (through link 5 in Fig. 1), which represent the person's defects criticised. As a result, these features become the focus of attention and appear magnified and distorted. This salience-driven magnification of defects serves to alert the executive function that the current situation is close to a traumatic point, and gives an indication of the features that need close monitoring. If the feature criticised is "bat ears", when looking at the mirror the person will see his/her ears magnified and more protruded, like in a caricature.

This phenomenon is reminiscent of symptoms relevant to a wide range of mental disorders, starting from the hallucinations, the delusions and, more in general, the "delusional atmosphere" that characterises schizophrenia (Moskowitz et al., 2008). Transitory perceptual distortions or "pseudo-hallucinations" are not uncommon also in personality disorders (Gras et al., 2014). Perceptual distortions are present in body dysmorphic disorder, which can either appear stand-alone

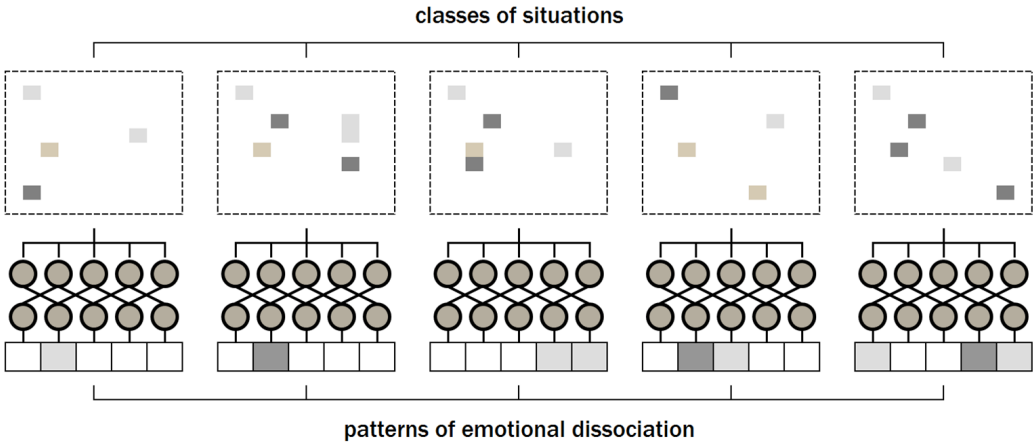

Figure 5: Classification of situations and patterns of emotional dissociation. The DM network classifies the input composed of cognitive features into a number of classes. For each class, it produces a specific pattern of emotional dissociation, i.e. a combination of attenuation levels for emotional channels. Depending on the number of parameters associated (which in turn depends on the number of neurons), the DM network can learn to map a different number of classes.

(Phillips, 2004) or be responsible for the dysmorphic body image associated to eating disorders (among many other disorders) (Ruffolo et al., 2006).

Selective dissociation

When the mind falls in the forbidden zone (poles B or C) dissociation is used to avoid emotional pain. We can hypothesise that, upon the first occurrence of a trauma, dissociation is total and involves both the cognitive and the emotional part, with links 6 and 7 in Fig. 1 both disconnected. This kind of dissociation, which may correspond to the "freezing" behaviour of "disorganised attached" children (Main and Solomon, 1986), provides an effective shield to emotional pain. On the other hand, a condition in which all mental functions are turned off exposes the individual to serious consequences in a potentially dangerous environment: for this reason, the use of total dissociation as a defense mechanism cannot be sustained for long periods of time.

It is not unrealistic to assume that, in case of repeated traumas, the mind will try to replace total dissociation through more selective forms of dissociation, able to preserve a reasonable level of functioning. Emotional dissociation is a limited form of dissociation which, at or near a traumatic situation, excludes from consciousness *some* emotional channels. This is a common phenomenon. Medical students may be shocked when they see an operation for the first time, but they rapidly get used to it. The same happens to the medical staff of intensive care units, where death is a daily occurrence, or to the employees of a slaughterhouse. This happens to all of us, when we see poor people living in the street and pretend it is normal. We can think of this process as of a form of learning, in which the mind selects the smallest subset of reality that needs to be dissociated to avoid emotional pain without losing touch with the "here and now".

The learning of emotional dissociation can be obtained through a modulation of links 4 and 7 of Fig. 1, which could be attenuated in certain situations. We hypothesise that this is achieved

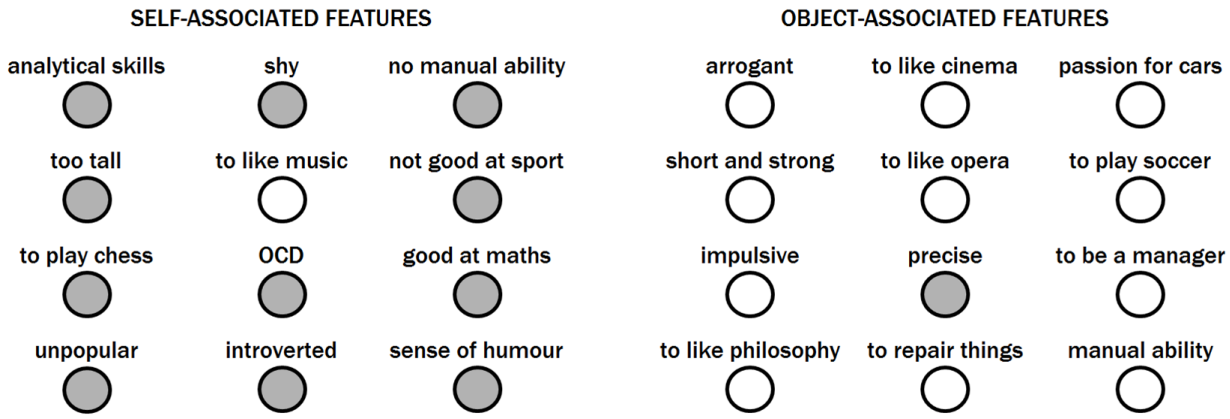

Figure 6: Self- and object-associated features (positive features are shown in white, negative features are shown in grey). In case of trauma, most self-associated features are negative and most object-associated features are positive. As a result, in most situations the self has a negative connotation, while the object has a positive connotation. Such features represent the foundation of the traumatic structure.

through a dedicated **dissociative modulatory network (DM network)** that receives in input the output of the salience module (cognitive features loaded with salience) and sends modulatory signals to the emotional channels (Fig. 4). In other words, for each situation, this network decides the degree of attenuation of each emotional channel (Fig. 4 shows modulation of link 7, but the same modulation could also be applied to link 5). As a result, different classes of situations are mapped to different emotional attenuation patterns (Fig. 5). It is not unreasonable to think that the classification power of the DM network (the number of classes that can be discriminated) depends on the number of neurons in the network.

4 Therapeutic proposal

So far, we have seen how our model requires a value gap between object and self (with the object perceived as worthier than the self) for the formation and maintenance of a psychological trauma of type B, and a low self value for a psychological trauma of type C. A popular line of thought maintains that, to resolve a trauma, it is necessary to relive mentally the traumatic event and reexperience the emotions associated, providing at the same time a more favourable interpretation of the traumatic event (e.g., “it was not your fault”, etc.). This can be done with the help of EMDR (Shapiro and Laliotis, 2010), which facilitates the reprocessing of the traumatic memories. However, if the associated pain (or shame, guilt, etc.) is too strong, the patient cannot relive it (resorts to emotional dissociation) and the trauma is not resolved.

Our proposal to overcome this obstacle is the *preventive* reduction of the pain level. As pointed out in section 3, the intensity of emotional pain is proportional to the value difference between object and self, which in turn depends on all associated features. If the self value is low, it is because most self-associated features are negative; if the object value is high, it is because most object-associated features are positive (Fig. 6). It is impossible to have a negative self linked

to mostly positive features, or a positive object linked to mostly negative features. In other words, the sets of features associated to self and object represent the foundation of the traumatic structure.

If the values of such features are modified, the values of self and object are expected to change accordingly and, as the value gap narrows, the level of emotional pain is expected to diminish. At this point, the trauma would be susceptible of being attacked with techniques such as EMDR, until its full resolution. Therefore, our therapeutic strategy is to target self- and object-associated features and change their values in the patient's mind.

The good news is that value is attributed to most features in a completely arbitrary way. This can be appreciated by considering the diversity of ideas, beliefs and reference values across ethnic groups, cultures, countries and historical periods. A high diversity in feature values can be observed also in the same historical period and in the same country, across different social networks. In a given family, the feature "being an artist" may be considered "cool" and appreciated, while "being an engineer" may be considered boring and worthless. For a different family, the opposite may be true. The value background of a person is initially set by the senior family members (usually the parents), but in principle nothing prevents to bring changes to it.

This can be achieved through **counterexamples**. Assuming, for instance, that the feature "risky" is negative, we can provide counterexamples in which a risk-taking behaviour yielded good results. We might mention Julius Caesar, who chose to cross the Rubicon; Butch Cassidy and Sundance Kid, who jumped into a waterfall and saved their lives (at least in the movie!). Given the negative feature "to fail", we might say that Henry Ford was bankrupt two times before succeeding, and so on. Linking positive examples to negative features raises the features' value. Likewise, the association of negative examples to positive features can be used to lower the features' value.

Figs. 7-10 report lists of counterexamples for features linked to four very common traumas, that can occur in any context: "imperfection", "weakness", "diversity", "being a loser". Both positive counterexamples (for negative self-associated features) and negative counterexamples (for positive object-associated features) are listed. Interestingly, many lists are present on the internet, that link negative features to famous (hence positive) persons, e.g.: "Celebrities who were bullied before becoming famous", "Gorgeous stars who were dumped in the worst ways possible", "Famous people with disabilities", etc. Internet users seem to be fond of such lists because, we think, these associations raise the value of self-associated negative features in the users' minds. As a consequence, the self value improves and these persons feel better.

We call this therapeutic scheme **Value-Oriented Counterexample-Supported Massively Associative Training (VOCSMAT)**. As suggested by these lists, there are usually many (hundreds) similar features linked to traumas: such features need to be all addressed. For each features, usually 3-4 counterexamples may be needed, which brings the total number of counterexamples around the figure of 1000. The counteracting associations could also be brought to the patient incorporated in a video, a format that could be easier to digest.

As a result of the therapy, the structure of the feature space should change from the pattern of Fig. 3-right to the pattern of Fig. 3-middle, turning a traumatic context into a normal one. This means that the forbidden zone and the transition zone disappear, together with the need

to use dissociation. However, the DM network of Fig. 4 would still be programmed to induce dissociation for the corresponding classes of situations. The lifting of dissociation could unfold automatically once the trauma is removed, or involve a re-learning process (the mind has to learn that the once traumatic area is now safe and dissociation is no longer needed). This could require an increase of the classification power of the DM network which, in turn, could require the presence of additional neurons.

The generation of new neurons in the dentate gyrus of the hippocampus is a process that continues for the whole duration of life (Eriksson et al., 1998), favoured by physical exercise (Nokia et al., 2016). An intriguing possibility is that the new hippocampal neurons may provide additional free parameters to the DM network, enabling a reconfiguration of its classification power. If this were true, we may want to suggest to complement the associative therapy described with some kind of physical exercise.

Framed in these terms, our therapeutic proposal might look deceptively simple. A difficulty we can expect to encounter is due to the fact that the number of self- and object-associated features might be very large (hundreds). This can be clarified through an example. Let us suppose we have 100 black socks that we want to turn into white socks: to achieve this goal, we apply a whitening solution to black socks. Let us also suppose that, at regular intervals, a random subset of socks is put into a washing machine. If the white socks in the washing machine are much fewer than the black socks (as we can expect at the beginning of the treatment), they will take the colour released from the black socks and turn black again. Only when the white socks become the majority, is the "washing machine effect" expected to be beneficial, but this may take a long time.

In this metaphor, black socks correspond to negative features, white socks correspond to positive features and the whitening solution corresponds to the VOCSMAT treatment described above. The washing machine corresponds to the associative mechanism of the mind, that continues to function during the therapy. If the therapy could be administered "offline", there would be no washing machine, but this is not possible. The therapy has to be carried out "online", with the mind fully connected to the external world, which might remind the patient how unworthy he/she is.

The therapeutic strategy suggested has some points of contacts with Cognitive Behavioural Therapy. We can highlight the key difference between our suggested therapeutic framework and Cognitive Behavioural Therapy through an example. If a person is convinced that "neighbours are spying on him", the therapist may try to convince the person that this is unlikely to be true. Our suggestion, instead, is to break the association between the idea and the negative content. In other words: "even if neighbours are spying on you, why is that a bad thing?"

Without treatment, the amount of unsolved traumas is expected to grow steadily during the course of life. Therefore, with age progression, we can expect to have an increasing number of life contexts and situations where dissociation is used and, as a result, the associative power of the mind is reduced. This would cause symptoms such as lack of attention, poor concentration, emotional detachment anhedonia, etc., which may add to the overall age-associated cognitive decline (Lindenberger, 2014). The proposed therapy could have an impact also on this phenomenon.

TRAUMA "IMPERFECTION"	
NEGATIVE SELF-ASSOCIATED FEATURES	**POSITIVE COUNTEREXAMPLES**
Physical defects and imperfections are negative, no one will like you	|C Mohandas Gandhi (short) |C Charles Maurice de Talleyrand (was a cripple) |C Sammy Davis Jr. (lost an eye) |C Dante Alighieri (ugly nose)
Making mistakes is negative, everything must be perfect and flawless	|C Ludwig van Beethoven (his manuscripts were full of mistakes) |C Albert Einstein (cosmological constant was wrong) |C Linus Pauling (DNA model)
Being the owner of an something imperfect or improper is negative	|C Lieutenant Colombo (car) |C "Deep Red" investigator (car) |C Wabi-sabi artworks
Making mistakes while driving, being bad at parking, etc., is negative	|C John Lennon (was a bad driver) |C Chevy Chase's character in "National Lampoon Vacation" |C Leo di Caprio's character in "Wolf of Wall St"
Irregularity or asymmetry (face, body, objects) is negative	|C Paolo Picasso |C Fernando Botero |C Amedeo Modigliani |C nature (e.g. giraffe, hippopotamus)
Being unable to complete all tasks, to leave unfinished work is negative	|C Franz Kafka's "Process" is unfinished |C Albert Einstein's unified field theory is unfinished |C Sagrada Familia is unfinished
Being distracted, clumsy, looking bad in public is tragic	No, it's funny |C Live fart of gym instructor |C King George VI of England was a stutterer
POSITIVE OBJECT-ASSOCIATED FEATURES	**NEGATIVE COUNTEREXAMPLES**
Pedantic criticism is positive	|C Criticism of jealous people |C mobbing |C psychological abuse
Never making mistakes, being efficient like a machine is positive	|C Alexey Stakhanov |C Charlie Chaplin's character in "Modern times"
Homogeneity, perfection and regularity are positive qualities	Boring |C empty spreadsheet |C flat electro-encephalogram |C blank screen

Figure 7: Counterexamples for features related to trauma “IMPERFECTION”. The symbol “| C” indicates a counterexample. Grey-shaded cells on the left side contain negative self-associated features; white-shaded cells on the right side contain positive counterexamples. White-shaded cells on the left side contain positive object-associated features; grey-shaded cells on the right side contain negative counterexamples. The information reported is correct to the best of the authour’s knowledge, does not refer to any specific “self” or “object”, is intended for scientific use only and does not intend to offend any person or entity. As a further precaution, only historical figures and fictional characters are used as examples.

TRAUMA "WEAKNESS"	
NEGATIVE SELF-ASSOCIATED FEATURES	**POSITIVE COUNTEREXAMPLES**
Having physical pain, being weak and suffering is negative	|C Leo di Caprio's character in "Wolf of Wall St" (back pain) |C Cristopher Columbus (had arthritis) |C John Kennedy (back pain)
Being a handicapped or a disabled person is negative	|C Louis Braille (was blind) |C Frida Kahlo (had spina bifida, polio) |C Piero de' Medici (had gout) |C Franklin D. Roosevelt
Having vision or hearing problems is negative	|C Ludwig van Beethoven (deaf) |C Leonhard Euler (blind) |C Helen Keller (blind)
Having a weak point is tragic	|C Achilles (heel) |C Napoleon Bonaparte (height) |C Julius Caesar (had epilepsy)
Losing or being unlucky, suffering "the slings and arrows of outrageous fortune" is negative	|C Napoleon Bonaparte (lost at Waterloo) |C Hannibal (lost 2nd punic war) |C Jim Carrey's character in "Bruce Almighty" |C Evariste Galois (died at 18)
Being shy is negative	|C Frédéric Chopin |C Mohandas Gandhi |C Isaac Newton |C Rosa Parks
Being mentally unstable, or having a mental disorder is negative	|C Abraham Lincoln (depression) |C John Nash (schizophrenia) |C Vincent van Gogh (bipolar disorder /depression)
POSITIVE OBJECT-ASSOCIATED FEATURES	**NEGATIVE COUNTEREXAMPLES**
Being big and strong is positive	Some animals, such as |C bison |C hippopotamus, are bigger and stronger than man |C Odissey's Cyclop
Being healthy is positive	Many |C idiots are healthy
If you have success in life, it means you are a valuable person	Some are just lucky |C Donald Duck's lucky cousin

Figure 8: Counterexamples for features related to trauma "WEAKNESS". The symbol "| C" indicates a counterexample. Grey-shaded cells on the left side contain negative self-associated features; white-shaded cells on the right side contain positive counterexamples. White-shaded cells on the left side contain positive object-associated features; grey-shaded cells on the right side contain negative counterexamples. The information reported is correct to the best of the authour's knowledge, does not refer to any specific "self" or "object", is intended for scientific use only and does not intend to offend any person or entity. As a further precaution, only historical figures and fictional characters are used as examples.

TRAUMA "DIVERSITY"	
NEGATIVE SELF-ASSOCIATED FEATURES	**POSITIVE COUNTEREXAMPLES**
Being "strange", different from others, not average is negative	|C Ticho Brahe (kept a dwarf under the table) |C Salvador Dalì |C Nikola Tesla (was obsessed with dirt and was afraid of round objects)
Having no practical or manual skills is negative	|C Albert Einstein (was very distracted) |C John Lennon (was a bad driver)
Being criticised or rejected or made fun of is negative	|C Napoleon Bonaparte (at military academy) |C Thomas Edison (was fired) |C Albert Einstein (was kicked out of school)
Doing multiple or strange jobs, having an unusual career path is negative	|C Ray Kroc (sold milkshake machines before McDonalds) |C Jack London (did many jobs before becoming a writer) |C Thomas Paine
Being a workaholic, unable to relax in holidays and enjoy life is negative	|C Winston Churchill |C Thomas Edison |C Margaret Thatcher ("sleep is for wimps")
Being an adult person interested in comics, children's books or fantasy movies is negative	|C Walt Disney |C Federico Fellini |C Jack London ("The call of the wild") |C the story of Pinocchio |C Charles Schulz
Having a different sexual orientation or engaging in alternative sexual practises is negative	|C Gabriele d'Annunzio |C Lesbo (was lesbian) |C Alan Turing (was gay) |C Alexander the great (was bisexual)
POSITIVE OBJECT-ASSOCIATED FEATURES	**NEGATIVE COUNTEREXAMPLES**
Having manual skills, being gifted for mechanics and bricolage is positive	It's trivial, like |C collecting stamps or |C points on fidelity card
Being popular is positive	|C Adolf Hitler |C Benito Mussolini and several other |C dictators
Doing like the others is positive	|C sheep in the herd |C Asch conformity experiments |C herd mentality

Figure 9: Counterexamples for features related to trauma “DIVERSITY”. The symbol “| C” indicates a counterexample. Grey-shaded cells on the left side contain negative self-associated features; white-shaded cells on the right side contain positive counterexamples. White-shaded cells on the left side contain positive object-associated features; grey-shaded cells on the right side contain negative counterexamples. The information reported is correct to the best of the authour’s knowledge, does not refer to any specific “self” or “object”, is intended for scientific use only and does not intend to offend any person or entity. As a further precaution, only historical figures and fictional characters are used as examples.

TRAUMA "BEING A LOSER"	
NEGATIVE SELF-ASSOCIATED FEATURES	**POSITIVE COUNTEREXAMPLES**
Being small or short is negative	|C Alexander the Great |C Napoleon Bonaparte |C Lt. Columbo |C Yuri Gagarin
Being overweight is negative	|C Marlon Brando |C King Henry VIII of England |C Luciano Pavarotti
If you do not dress according to latest fashion trends, you are a loser	|C Lt. Columbo |C Albert Einstein |C Bridget Jones (the movie)
If you are not good with girls, you are a loser	|C Niki Lauda vs James Hunt (movie "Race") |C Isaac Newton |C Nikola Tesla |C Leonardo da Vinci
Having few friends, having a different opinion, being unpopular is negative	|C Napoleon Bonaparte (at military school was very unpopular) |C Barbara McClintock and |C Alfred Wegener (their theories were initially ignored)
Being rejected, getting no recognition for your work, failure is negative	|C Franz Kafka |C Rosalind Franklyn |C Gregor Mendel |C Edgar Allan Poe |C Ignaz Semmelweis
Being criticised is negative	|C Winston Churchill |C Charles Darwin (considered mediocre by his teachers and his father) |C Albert Einstein |C Franklin D. Roosevelt
POSITIVE OBJECT-ASSOCIATED FEATURES	**NEGATIVE COUNTEREXAMPLES**
Being popular, being a leadership and having power is positive	|C head of police in movie "Investigation of a citizen above suspicion" |C dictators
Being tall is positive	|C most "opponents" of Lt. Columbo (the murderers)
Having a lean and muscolar body, being fashionable is positive	|C persons with these features make sometimes stupid comments

Figure 10: Counterexamples for features related to trauma “BEING A LOSER”. The symbol “| C” indicates a counterexample. Grey-shaded cells on the left side contain negative self-associated features; white-shaded cells on the right side contain positive counterexamples. White-shaded cells on the left side contain positive object-associated features; grey-shaded cells on the right side contain negative counterexamples. The information reported is correct to the best of the authour’s knowledge, does not refer to any specific “self” or “object”, is intended for scientific use only and does not intend to offend any person or entity. As a further precaution, only historical figures and fictional characters are used as examples.

5 Conclusions

The objective of this work was to merge the psychodynamic theory based on defense mechanisms and the theory of dissociation as a response to trauma, to produce a new framework for the description of psychological traumas, and propose a new therapeutic framework. Future research will be aimed at developing the model proposed and draw from it further insights for therapy.

6 Disclaimer

The authour is an employee of the European Research Council Executive Agency. The views expressed are purely those of the writer and may not in any circumstances be regarded as stating an official position of the European Commission.

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